

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 6,791,059 B2
 DATED : September 14, 2004
 INVENTOR(S) : Donald V. Smart

Page 1 of 3

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 9,

Line 24, delete "K" and insert -- κ -- (a Greek kappa).

Column 10,

Line 56, delete "Nd:V₀₄" and insert -- Nd:VO₄ --.

Column 11,

Line 40, after "pump efficiency" delete " ϵ " and insert -- E is--.

Column 12,

Line 5, delete "Electrons" and insert -- Electronics --.

Line 28, delete " $r^n(r)$ " and insert -- $r\eta(r)$ -- (use a Greek eta instead of a superscript n).

Lines 33 and 34, delete " $^n(r)$ " and insert -- $\eta(r)$ -- (use a Greek eta instead of a superscript n).

Column 14,

Line 32, delete "lasers" and insert -- laser --.

Column 18,

Line 53, insert the following claims 32-51, which correspond to application claims 88-107

— 32. A laser-based method of vaporizing and removing a target link structure on a semiconductor wafer comprising the steps of:
 providing a target link structure supported on a silicon substrate, the substrate being part of a semiconductor memory device;
 producing a laser beam having a pulse width less than about 10 nanoseconds, an operating repetition rate of 5 kilohertz or higher, and a wavelength less than 1.2 microns;
 generating computer-controlled timing signals synchronized with position of the laser beam relative to the target link structure;
 controllably switching an optical switch based on the timing signals so as to transmit an output pulse of the laser beam to the target link structure on demand, the output pulse rate being controlled by controlling the optical switch;
 focusing the output pulse onto the target link structure into a spot diameter, whereby the spot size and depth of focus is improved relative to a longer wavelength greater than 1.2 microns, and the output pulse width limits damage to the substrate.

33. The laser system of claim 32 wherein the laser beam has a pulse width less than precisely 10 nanoseconds.

34. The laser system of claim 32 wherein the laser beam has an operating repetition rate of 10 kilohertz or higher.

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Column 18 (cont'd).

35. A laser system for vaporizing and removing a target link structure on a semiconductor wafer, comprising:

a laser assembly configured to produce a laser beam having a pulse width less than about 10 nanoseconds, an operating repetition rate of 5 kilohertz or higher, and a first wavelength, and configured to shift the first laser wavelength to a second laser wavelength, the second wavelength being less than 1.2 microns;

a computer programmed to control timing signals synchronized with position of the laser beam relative to a target link structure supported on a silicon substrate, the substrate being part of a semiconductor memory device; and

an optical switch that is controllably switchable based on the timing signals so as to transmit an output pulse of the laser beam to the target link structure on demand, the output pulse rate being controllable by controlling the optical switch, the laser assembly being configured to focus the output pulse onto the target link structure into a spot diameter;

whereby the spot size and depth of focus is improved relative to a longer wavelength greater than 1.2 microns, and the output pulse width limits damage to the substrate.

36. The method of claim 35 wherein the laser beam has a pulse width less than precisely 10 nanoseconds.

37. The method of claim 35 wherein the laser beam has an operating repetition rate of 10 kilohertz or higher;

38. A method of vaporizing and removing a target link structure on a silicon substrate, comprising the steps of:

providing a computer controlled ,diode-pumped, q-switched, solid-state laser assembly;

producing a laser beam output having an output pulse width less than about 10 nanoseconds at an operating repetition rate of about 5 kilohertz or higher, and a wavelength shorter than 1.2 microns; and

focusing the output pulse onto the target link structure into a spot diameter.

39. The method of claim 38 wherein the laser beam has a pulse width less than precisely 10 nanoseconds.

40. The method of claim 38 wherein the laser beam has an operating repetition rate of 10 kilohertz or higher.

41. The method of claim 38 wherein the laser wavelength is about 1.047 microns.

42. The method of claim 38 wherein the laser wavelength is about 1.064 microns.

43. The method of claim 38 wherein the link is a thin link less than one micron in width , and whereby the spot size and depth of focus is improved relative to a longer wavelength greater than 1.2 microns, and the output pulse width limits damage to the silicon substrate.

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Column 18 (cont'd).

44. The method of claim 43 wherein the link is a polysilicon link.

45. The method of claim 43 wherein the link is a metal link.

46. The method of claim 38 wherein the solid state laser system further comprises an optical switch positioned beyond the laser cavity and external to the laser cavity and wherein the method further comprises controllably switching the optical switch based on computer controlled timing signals so as to transmit an output pulse of the laser beam to the target link structure on demand, the output pulse rate and pulse spacing being controlled by the controlling the optical switch.

47. The method of claim 38 wherein the output pulse width is less than about 5 nanoseconds.

48. The method of claim 38 wherein the output pulse width is less than about 8 nanoseconds.

49. A laser system for vaporizing and removing a target link structure on a silicon substrate, comprising:
a diode-pumped, q-switched, solid-state laser assembly;
a computer programmed to control the laser assembly to cause the laser assembly to produce a laser beam output having an output pulse width less than about 10 nanoseconds at an operating repetition rate of about 5 kilohertz or higher, and a wavelength shorter than 1.2 microns;

the laser assembly being configured to focus the output pulse onto the target link structure into a spot diameter.

50. The system of claim 49 wherein the laser beam output has an output pulse width less than precisely 10 nanoseconds.

51. The system of claim 49 wherein the laser beam output has an operating repetition rate of 10 kilohertz or higher.—

Signed and Sealed this

Fifth Day of April, 2005



JON W. DUDAS
Director of the United States Patent and Trademark Office